

No. 684,471.

Patented Oct. 15, 1901.

L. O. STEVENS.  
ROTARY ENGINE.

(Application filed Apr. 4, 1901.)

(No Model.)

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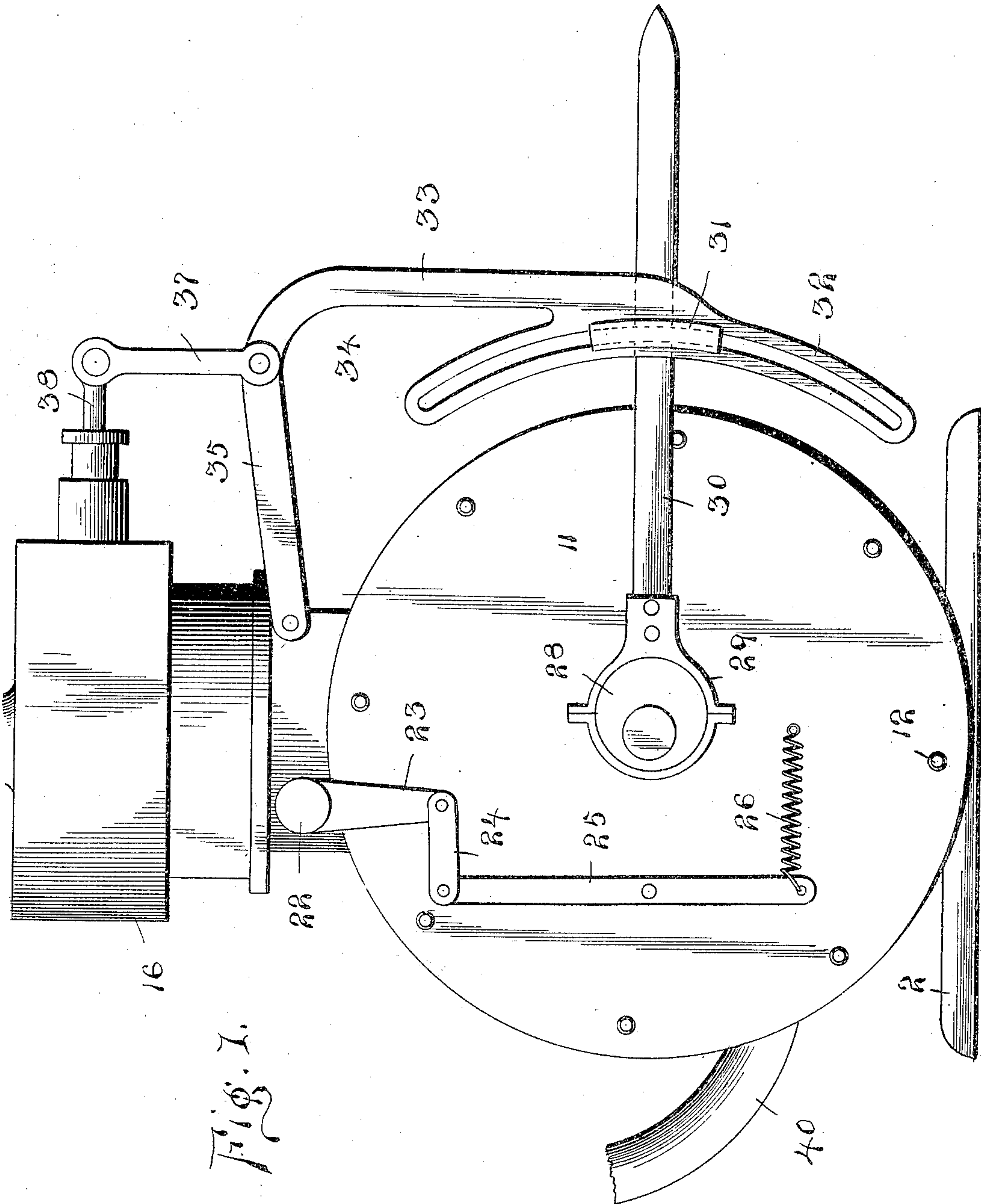


Fig. 1.

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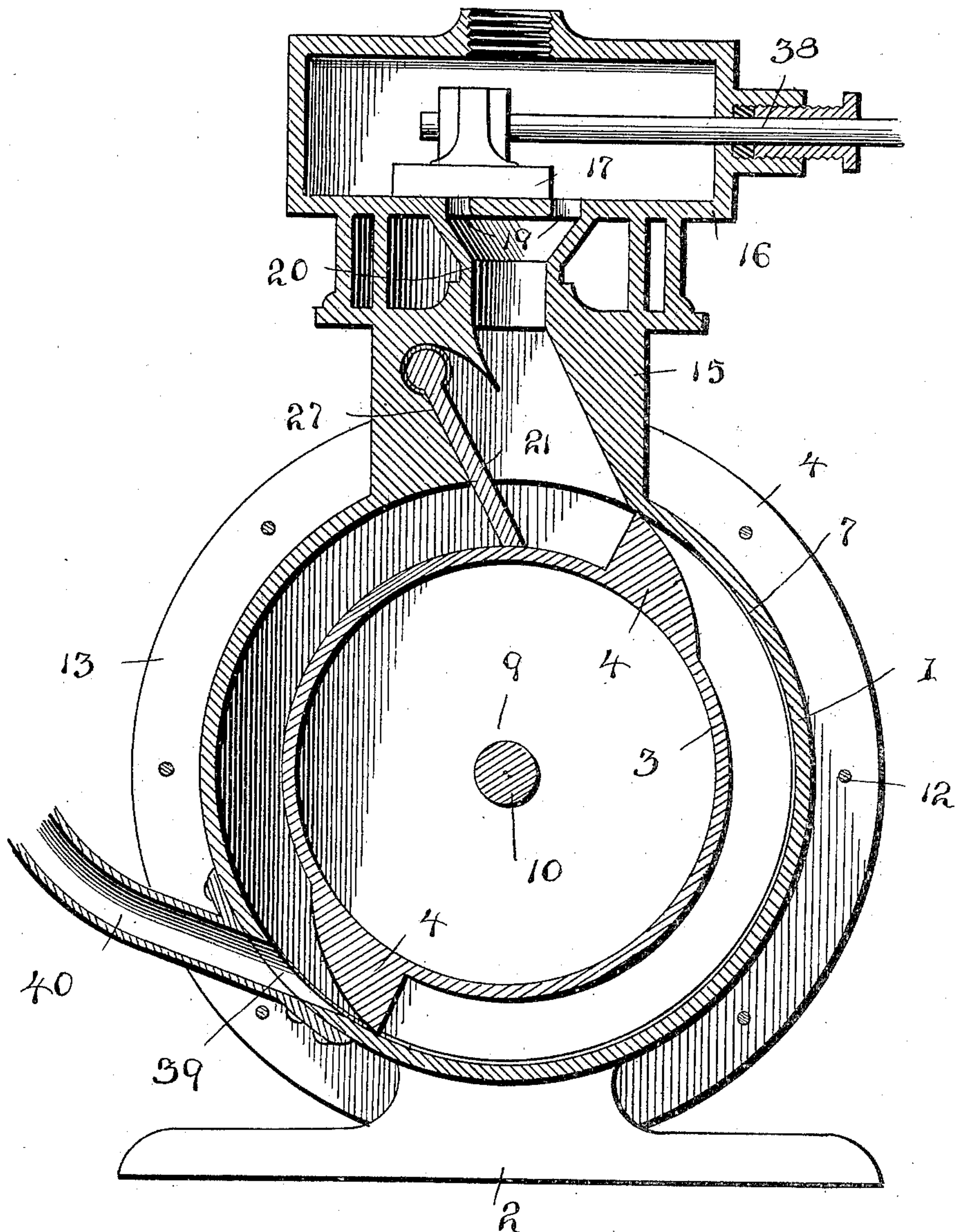
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Fig. 2.



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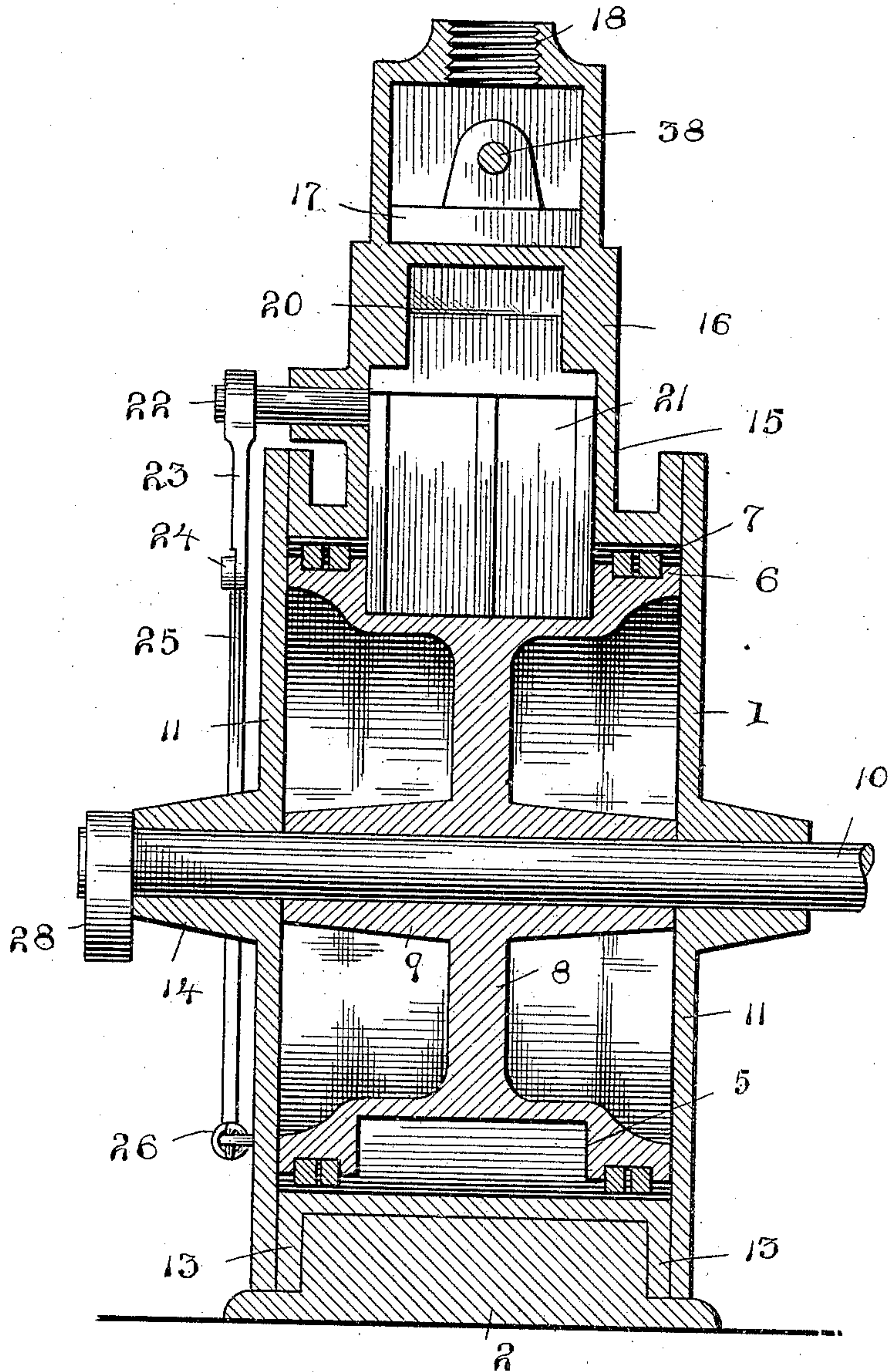
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Fig. 3.



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# UNITED STATES PATENT OFFICE.

LUCIOUS O. STEVENS, OF PEORIA, ILLINOIS, ASSIGNOR OF ONE-HALF TO  
JOHN DAILEY AND ABRAHAM JACOBSON, OF SAME PLACE.

## ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 684,471, dated October 15, 1901.

Application filed April 4, 1901. Serial No. 54,317. (No model.)

*To all whom it may concern:*

Be it known that I, LUCIOUS O. STEVENS, a citizen of the United States, residing at and whose post-office address is 2825 North Madison avenue, Peoria, in the county of Peoria and State of Illinois, have invented new and useful Improvements in Rotary Engines, of which the following is a specification.

This invention relates to improvements in rotary engines, and more particularly relates to engines of the concentric type.

The object of the present invention is to provide a rotary engine of the character stated which is simple in construction, but at the same time having its parts so related as to be thoroughly reliable and efficient in operation; and, furthermore, the invention contemplates in the construction of a rotary engine an improved form of valve-gear, whereby the action of the valve controlling the inflow of the motive fluid will be thoroughly positive, yet capable of minute adjustment to provide for varying degrees of pressure upon the cylinder.

With these general objects in view and others which will appear as the nature of the improvements is better understood, the invention consists, substantially, in the novel construction, combination, and arrangement of parts, which will be hereinafter fully described, illustrated in the accompanying drawings, and pointed out in the appended claims.

In the drawings, Figure 1 is a side elevation of a rotary engine constructed in accordance with the present invention. Fig. 2 is a vertical transverse sectional view thereof. Fig. 3 is a similar view taken on a plane at right angles to Fig. 2.

Referring to the drawings, the numeral 1 designates the engine-cylinder, which cylinder is formed of suitable material, and arranged at the under side thereof is a base 2 for supporting the engine in operative position. Arranged within the cylinder 1 is a drum 3, provided upon its periphery with pistons 4. It will be observed, however, that the periphery of the drum 3 is grooved or channeled, and arranged at each side of said groove or channel is an annular flange 5, each of which flanges is grooved or channeled, as at 6, for the reception of a pair of resilient

packing-rings 7, and said packing-rings cooperate with the contiguous portions of the cylinder 1 to prevent the escape of steam there-through. The drum 3 is also provided with a central web 8, which extends from a transversely-arranged hub 9, disposed in a central position with relation to the edges of the drum. Fitted within the hub 9 is a shaft 10, the ends of which project beyond the sides of the cylinder 1, and it will be observed at this point that said sides are formed of a pair of detachable plates 11, the outer edges of which are bolted, as at 12, to annular flanges 13, formed at the edges of the cylinder 1. Each of the plates 11 is provided at its outer side with an outwardly-extending hub 14, said hubs constituting bearings for the ends of the shaft 10, and it is obvious that said bearings are provided with suitable lubricating devices for the purpose of reducing friction between the same and said shaft.

Arranged at the upper portion of the cylinder 1 is an upwardly-extending neck 15, and arranged at the upper end of said neck is a steam-chest 16, within which a reciprocating valve 17 is arranged, the upper portion of the steam-chest 16 being provided with an inlet 18, through which the motive fluid is introduced to said chest. The chest 16 is also provided at a point in alinement with the inlet 18 with a pair of ports 19, through which the steam passes from the chest 16 to the cylinder 1. It will be observed, however, that the ports 19 discharge into a flared passage 20, through the medium of which the motive fluid is directed into the cylinder 1, but intermediate the passage 20 and the piston 3 is arranged an abutment 21, the upper edge of which is connected to a transversely-extending rock-shaft 22, one end of which projects beyond the side of the neck 15. Depending from the projecting end of said shaft is an arm 23, to which arm is connected a horizontally-disposed link 24, and said link 24 is in turn connected to the upper end of a rocker-arm 25, pivoted to the side of the cylinder 1. Connected to the lower end of the rocker-arm 25 is a spring 26, the tension of which is exerted to maintain the abutment 21, through the interposition of the arm 25, the link 24, and arm 23, in close contact with the periphery of the drum 3 and in position to be engaged by the pistons 4



during the rotation of the drum 3. The main purpose, however, of the abutment 21 is to prevent back pressure of the steam upon the piston, which has been relieved of the live steam at the exhaust, as will appear more fully hereinafter. It is essential, however, that the abutment 21 should be properly braced when in contact with the periphery of the drum 3, so that the steam entering from the passage 20 will in no wise derange the relation of said abutment with said drum, and to this end an inclined seat 27 is provided at the interior of the neck 15 and at a point below the shaft 22. It will thus be seen that when the abutment 21 is in its lowered position the same rests upon the seat 27 and is effectually braced by the same, so as to prevent displacement except by the pistons 4 during the rotation of the drum 3.

The operation of the valve 17 is such as to close the ports 19 when the abutment 21 has been raised by the pistons 4, and thereby cut off the flow of steam from the chest 16 into the passage 20; but in order that the movement of the valve 17 may be properly effected an eccentric 28 is mounted upon the shaft 10 at the exterior of the cylinder, and said eccentric is surrounded by a strap 29, connected to a rod 30. The rod 30 is provided with an arcuate cross-head 31, which cross-head has a sliding engagement with and fits within a curved link or arm 32. The link or arm 32 is carried by the vertical arm 33 of an angle-lever 34, the horizontal arm 35 of which lever is pivotally connected to the neck 15, as at 36, and pivotally connected to the angle-lever 34 is a link 37, which link is also pivotally connected to the stem 38 of the valve 17. It will thus be seen that as the eccentric 28 moves with the shaft 10 motion is imparted therefrom to the valve 17 through the rod 30, the link or arm 32, the angle-lever 34, the link 37, and the stem 38 of said valve, whereby the ports 19 are uncovered at the proper time to admit the motive fluid from the chest 16 into the passage 20 and to the pistons 4. It will also be observed that should it be desired to regulate the size of the ports 19, so as to increase or diminish the amount of pressure upon the pistons 4, the same is accomplished by adjusting the cross-head 31 at different points within the link or arm 32, so as to regulate the pitch or throw of the angle-lever 34, and in turn to regulate the degree of movement of the valve 17 in relation to the ports 19. An exhaust-port 39, arranged at the lower portion of the cylinder 1 and communicating with a pipe 40, clears the cylinder of the expanded steam when each abutment arrives at said port.

The operation of the herein-described engine is as follows: Steam being admitted through the inlet 18 fills the chest 16, and when the ports 19 have been uncovered, according to the direction of movement of the valve 17, the steam flows into the passage 20 and is directed thereby against the abutment

21. This abutment being in contact with the periphery of the drum 3, it is obvious that the steam exerts its expansive force upon the piston 4 immediately in advance of said valve, and hence a rotary movement is imparted to the drum. As the piston under the pressure of the steam thus supplied reaches the port 39 said steam immediately exhausts there-through, but the piston continues its movement and when brought into contact with the abutment 21 raises the same. The spring 26 is thereby tensioned, and immediately after the piston passes from under the abutment 21 said spring at once returns the abutment to close contact with the periphery of the drum 3, so that possibility of back pressure upon the piston in rear of the abutment 21 is entirely obviated. As the pistons 4 are directly opposite each other it will also be seen that when the steam in rear of one is exhausting through the port 39 live steam is being fed to the other, so that a constant pressure upon the drum 3 is always insured.

The form of the invention herein shown and described is what is believed to be a preferable embodiment thereof; but it is obvious that many variations may be made, and the right is therefore reserved to modify or vary the invention as comes within the spirit and scope thereof.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a rotary engine, the combination with the rotary drum and its pistons; of a valve for controlling the inflow of the motive fluid, an angle-lever arranged intermediate said drum and valve; connecting means between the valve and angle-lever; an eccentric operated by the revolution of the drum; a slotted link carried by the angle-lever, and connecting means between the eccentric and angle-lever comprising a rod, and a cross-head, the latter being adjustably supported by said link.

2. In a rotary engine, the combination with a drum and pistons thereon; of a valve for controlling the inflow of motive fluid; an abutment arranged between said drum and said valve; means for returning said abutment to its normal position in contact with the drum after the passage of the pistons thereunder; an angle-lever for operating said valve; a slotted link connected to said angle-lever; an eccentric operated by the revolution of the drum; a rod operated by said eccentric and a cross-head carried by the rod and fitted within said slotted link whereby the adjustment of said cross-head within said link is adapted to adjust the inlet-valve to regulate the degree of pressure upon the pistons.

In testimony whereof I affix my signature in presence of two witnesses.

LUCIOUS O. STEVENS.

Witnesses:

G. B. GEIGER,  
DAVE ELLMON.